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THE INTER-NATION TENSIOMETER FOR THE PREDICTION OF WAR,(U)
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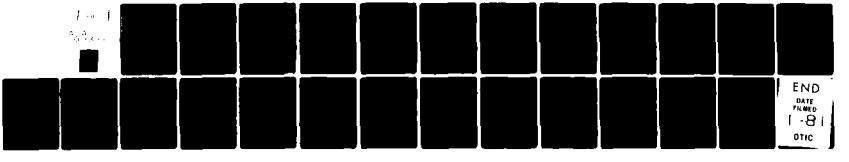

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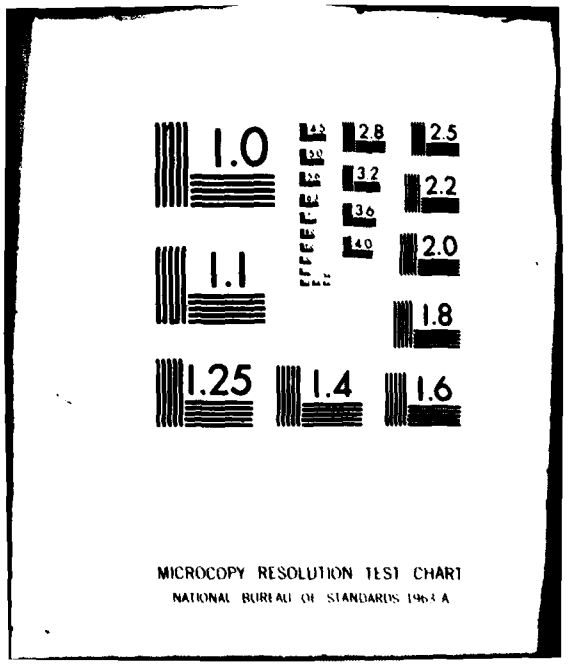
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NATIONAL BUREAU OF STANDARDS 1963 A

THE INTER-NATION TENSIOMETER FOR THE PREDICTION OF WAR

by

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INTRODUCTION

This is the seventh paper in the Tensiometer series; all of these papers have been concerned with the prediction of war or, more accurately, with the development of a tension scale which has a critical value such that,if the value for a nation exceeds that critical value,it then is in a class more likely to go to war in the following five years than if its value is sub-critical. Nations are treated as monads and if they are supra-critical we can not say with which other nation they are likely to become involved in a war; we can only say that they are "nations at risk". We are only concerned with wars in which two or more nations are involved; Raimo Väyrynen (1971) has suggested that countries with low Tension Ratios (TRs) were more likely to become involved in civil wars. The last time we looked into this question the number of civil wars was so small that our results were not conclusive but we did note that the civil wars seemed to be fairly evenly distributed between countries with high,medium and low TRs.

Studies on arms races (Richardson,1960; Smoker,63-65;Wolfson,1967) certainly have a great deal of value for illuminating the response and counter-response of an inter-acting dyad but have the severe limitation that the dyad must be known.The other limitation is that the world may not consist of dyads; the weapons which India acquires in order to defend itself against China may be viewed as offensive weapons by the Pakistanis!

All the papers in this series are concerned with all the nations in the world since 1950 (we would love to work on the nations for the decade of the thirties but no data are available). Otterbein (1972) has studied "primitive" societies and has found that,"the higher the degree of military sophistication, the more likely that the political communities of a cultural unit will engage in frequent ... offensive external war." His finding is in agreement with our studies of "civilized" societies.

Alcock (1970) has shown that war correlates with the rate of increase in arms expenditure and it was in attempting to investigate changes in TRs that this paper changed its nature from the time when the original abstract was sent to I.S.A. and today. When the abstracts was written we had just finished writing the "Final" book on the Tensiometer. Before the book was printed we began a project to measure changes in the TRs with time to see if they coincided with political events. To our great surprise we found that they coincided most of all with the entry into the system of data from another source.! For most of the period 1950-1968 we had obtained GNP data from the United Nations

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Year Book of National Accounts Statistics, 1957-1968, Military Expenditure (M.E.) data were from the *SIPRI Yearbook of World Armaments and Disarmament 1968/69* and the Population data were from the U.N. *Demographic Yearbook, 1970*. These three sources did not, however, have information for all nations for all years. Since we wanted as many nations and as many years as possible to be included in our study we had obtained missing data from other, equally reliable, sources, several of them in fact. Each time a new data source entered the system for a country it produced a major change in the T.R. for that country. We have concluded that there is a real need for one such agency, such as SIPRI or ACDA to collect and publish M.E., G.N.P. and Population data for every country for as many years as possible. In the meantime we stripped out the information coming from the supplementary sources for the years 1961,2 and 1963 and changed for the years 1964 to 1970 to A.C.D.A.'s GNP and M.E values while still obtaining data for Population from the U.N. Demographic Yearbook. Incidentally this meant that for the years 1950-1963 we use data in constant 1960 U.S. dollars but for 1964 to 1970 we are using current U.S. dollars. Non incidentally it also meant that we had to scrap several hundred dollars worth of printing plates, but when the book appears later this year it will be worth more.

We can not present in this paper the results which can only be obtained by publishing a book. We have chosen therefore to describe the methodology and the data for 1961 and another year together with the final results for the period 1950-1970.

METHODOLOGY

In former publications (Newcombe, *et al.* 1969,1972,1972 and 1973) we used GNP and M.E. values. Later (Newcombe, *et al.* 1974 and 1974) we found that GNP/Cap. and M.E./Cap. values gave much better results. and in the paper by Newcombe,Barber,Wert, Haven and Hiebert we reported on two relationships between GNP/Cap. and M.E./Cap., namely, that of a straight line and a hyperbolic one. In the present study we are still calculating both of these relationships and have concluded that the straight line relationship gives the better results.

In Table 1961 A you will find the national indicators that we used together with the rankings of each nation with respect to GNP/Capita (ranking in column G) and M.E./Cap. (ranking in column H). Albania is 15th in M.E./Cap but 40th in GNP/Cap and is, therefore, with respect to other nations an over-spender on M.E./Cap.; this is indicated by the letter "O" in column I. Argentina, on the other hand is 39th in M.E./Cap but 29th in GNP/Cap and is, therefore, with respect to other nations an under-spender on M.E./Cap; this is indicated by the letter "X" in column I. West Germany is 9th on both scales and this is indicated by the * in column I.

We then plotted M.E./Cap values against GNP/Cap. values for each nation using the letters "O" or "X" according to column I for plotting each nation (* in the case of West Germany,Sudan,and the USA). We then proceded to plot the "best" straight line and

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Washington, D.C. 20520

February 6, 1980

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Sincerely,

Edward N. Lundstrom

Edward N. Lundstrom
Research Documentation Officer
Office of External Research
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the "best" hyperbola which would separate the "Os" from the "Xs" while ignoring the asterisks. A line is considered "best" which:

1. Separates the "Os" from the "Xs" with the least number of wrong countries i.e. "Os" on the side of the line occupied by "Xs" and "Xs" on the side of the line occupied by "Os".
2. If two lines will separate "Os" and "Xs" with the same number of "wrongs" the line is chosen which has the better balance i.e. if two lines each have four "wrongs" but with one line there are 3 Os wrong and 1 X while the second line has 2 Os and 2 Xs wrong the second line would be called the "best" line.
3. Experience has taught us that Italy and German,W. are frequently on the wrong side of the line and they have been,therefore, almost ignored in choosing the "best" line, similarly we have tried to maintain the least change in the equation for the line from year to year and we may choose a "best" line which has more "wrongs" but is closer to the equations obtained for former years. This "averaging through time" technique eliminates changes in TRs due to a line being drawn which is radically different from lines for the previous year.

From the graph we determine the equation for the straight line and the hyperbola and then, for each country, calculate the "theoretical" value of the M.E./Capita. These values are shown in columns K and N of the 1961B table.The actual values of the M.E./Capita are then divided by the theoretical values of the M.E./Capita and multiplied by 100 to produce the TR values shown in columns M and P.
In that table we have also calculated the theoretical total Military Expenditure and these values are given in columns L and O.For example, we know from table 1961A that the actual military expenditure was 47,335. millions and columns L and O in table 1961 B tell us that 18,699 (or 17,213.7) of this was due to the GNP contribution.

The tension ratios are arranged in descending order (column T) in Table 1961C. Also in this table are the deadly quarrels which were ongoing in 1961 and a column listing new war involvement in the five years following 1961.At the bottom of the first page is the $TR_{Critical}$ established for the hyperbolic relationship (a value of 127) the corresponding value for the straight line relationship is 99.0. As you can see from the two pages of table 1961C the new war involvement is all above the critical values.

The critical values for the straight line were established by calculating using the Fisher exact test of significance, the value of P at various levels of T.R. These results are shown in the following Table in which the three most significant levels are marked.For the straight line the best value is at TR=99.0 and the P value says that there is 1 chance in a thousand (or 1227 in a million) that the relationship between the TRs and the occurrence of war in the following five years when the countries are divided into those above and below TR=99.0 is due to chance, i.e. a significance level of about 99.9. Similarly for the hyperbola the most significant level for a $TR_{Crit.}$ value is at TR=127 when the value of P is 471 chances in a million (0.000471) or roughly 5 chances in 10,000 (i.e. 99.99). One question we have not yet resolved is whether there is a real difference between the TR of 127.0 and 103.0 as a critical value for the hyperbola; admittedly the corresponding p values are 0.000471 and 0.001651 but both values are rather good.

We then used the $TR_{Crit.}$ values of 127.0 for the hyperbola and 99.0 for the straight line (we also ran a straight line $TR_{Crit.}$ of 124.0 for comparison) to divide nations for each year into the <u>supra-critical</u> and <u>sub-critical</u> categories. Nations at war were excluded from the count unless they became involved in another war in the following five years (a list of wars is also included in this paper). For both the

supra-critical and the sub-critical nations the percentage of each category which became involved in a war in the following five years was calculated. P values for the distribution of the nations into the four categories of "supracritical" "sub-critical" "becoming involved in war" and "remaining at peace". Also calculated and shown in the Tables are the percentage of supra-critical countries which became involved in war divided by the percentage of sub-critical countries which became involved in war; this ratio is mainly indicated by "Ind." for Indeterminate because one can not divide by zero. We therefore took the sums of the various expressions were calculated for the 10 years 1950-1959 and the ten years consisting of 1960 and 1962-1970, and also for the 20 year period studied.

One conclusion we can immediately arrive at is that the p values for the decades and the 20 year period are rather good and such values are essentially the same. Another somewhat impressive number is that using the straight line relationship and a $TR_{Crit.}$ of 99.0 we found that 19.1 percent of the over-armed nations became involved in a war in the following five years over the period 1950-1970 whereas only 0.679 % of the under-armed became involved in wars. The ratio of these two percentages is 28.1; we feel that we can sum up the work by saying that in the years 1950 to 1970 (less 1961) the supra-critical nations were 28.1 times more likely to be involved in wars than were the sub-critical nations.

In comparing the critical values of 99.0 and 124.0 for the straight line we note that the W/U column for the critical value of 124. has 11 sub-critical countries involved in a war whereas the corresponding column for the critical value of 99.0 lists only 5 sub-critical nations. The hyperbola has 12 such countries.

The hyperbola shows that the over-armed nations were only 18.6 times more likely to become involved in wars than the sub-critical nations. In view of these results it is very likely that in future we will calculate only straight lines despite the fact that we have been biased towards hyperbolas because they enable us to calculate a TR for every country and pass through the origin which the straight lines do not.

We have not said anything about the mechanism relating supra-critical TR Values and the incidence of war. It may be that a nation decides to wage aggressive war and increases its M.E. for this purpose; this in turn may start an arms race with one of its neighbours. Alternatively it may be that a nation inadvertently becomes supra-critical and then acquires a tougher foreign policy which in turn requires the M.E. to be increased, etc.

CONCLUSIONS

The use of GNP/Capita and M.E./Capita data and the assumption of a straight line relationship between these two indicators produces the best values of Tension Ratios. Using the $TR_{Crit.}$ value of 99.0 divides countries into those likely to become involved in a war in the following five years and those unlikely to become involved in a war in the following five years; the over-armed are 28 times more likely to become involved in war. Since the T.R. indicator post-dicts rather well it is likely that it will also predict just as well.

FUTURE WORK

Using the data now available from ACDA (we hope that the U.S. Congress and people appreciate their invaluable work as much as we do.) we will calculate the TRs for 1971, 1972 and 1973 and predict the future (or rather predict which nations are most at risk). This work will be presented, we hope, at one of the regional meetings of the Peace Science Society (International). Readers who will not be present at these meetings may want to look at the last tables in this paper; the tables for 1973 are still slightly tentative since we may adjust the lines slightly (the work has been done in a mad rush in the last few days). The only countries likely to become sub-critical are Kenya, Sweden and perhaps Yugoslavia.

After the book is ready for printing and the 1971-1973 paper is written we

intend to to a regression analysis, using the $\bar{5}\bar{TR}$ values, to attempt to measure quantitatively such things as the Richardson Island effect, the alliance relaxation effect (which could also turn out to be a big power paranoia effect), the influence of the number of borders first reported by Richardson and disproven by Rummel, Alcock and especially by KÖhler and similar ideas.

We also want to see if we can develop another indicator or scale which would separate the supra-critical nations into a group ready and able to become involved in a war and those certain to become involved in a war. KÖhler's method, which predicts war six months in advance on the basis of events data analysis is not long range enough in time for this purpose.

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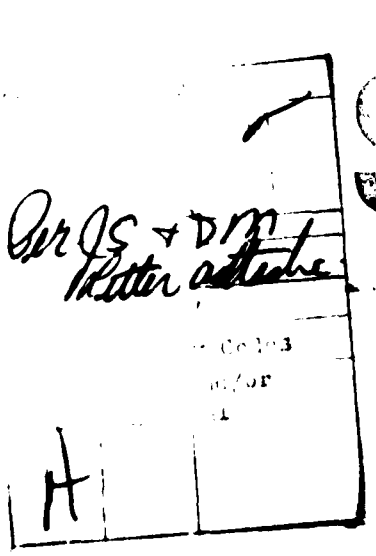

YEAR= 1961 | TABLE 1961A - NATIONAL INDICATORS | YEAR = 1961

COUNTRY (A)	POP. x10^6 (B)	GNP 1960 U.S. (C)	M.E. $ x 10^6 (D)	GNP/Cap. (E)	M.E./Cap. (F)	n=73 Ranks of "E" (G)	"F" (H)	Rank Discrepancy (I)
Albania	1.66	462.	70.	278.31	42.17	40	15	0
Argentina	21.20	11660.	299.	550.00	14.10	29	39	X
Australia	10.55	16052.	425.	1521.52	40.28	7	16	X
Austria	7.09	6668.	71.	940.48	10.01	20	43	X
Belgium	9.18	12115.	391.	1319.72	42.59	15	14	0
Bolivia	3.92	387.	5.9	98.72	1.51	67	70	X
Brazil	71.87	14086.	278.	195.99	3.86	54	59	X
Bulgaria	7.94	4756.	186.	598.99	23.43	27	24	0
Burma	22.78	1466.	82.9	64.36	3.64	72	61	0
Canada	18.27	37261.	1708.	2039.46	93.48	2	3	X
Ceylon	10.13	1380.	15.2	136.23	1.50	62	71	X
China	647.21	68100.	3300.	105.22	5.10	65	53	0
Chile	7.89	4079.	117.	516.98	14.83	33	37	X
Columbia	15.91	4116.	67.8	258.71	4.26	43	55	X
Costa Rica	1.30	1200.	5.6	923.08	4.31	22	54	X
Czechoslovakia	13.78	20736.	1125.	1504.79	81.64	8	6	0
Denmark	4.61	6335.	164.	1374.19	35.57	12	17	X
Dominican R.	3.15	737.	34.4	233.97	10.92	44	41	0
Ecuador	4.50	918.	27.7	204.00	6.16	51	48	0
El Salvador	2.53	584.	6.3	230.83	2.49	45	64	X
Ethiopia	21.16	975.0	32.7	46.08	1.54	73	69	0
Finland	4.47	5379.	96.0	1203.36	21.48	17	25	X
France	46.16	62392.	3876.	1351.65	83.97	13	5	0
Germany,E.	16.06	22148	710.	1379.08	44.21	11	13	X
Germany,W.	54.03	76307.	3082.	1412.31	57.04	9	9	*
Ghana	6.96	948.	20.6	136.21	2.96	63	62	0
Greece	8.40	3927.	220.	467.50	26.19	34	22	0
Guatemala	3.98	1076.	10.3	270.35	2.59	41	63	X
Honduras	1.91	388.	8.1	203.14	4.24	52	56	X
Hungary	10.03	9269.	204.	924.13	20.34	21	27	X
India	439.00	32155.	625.0	73.25	1.42	71	72	X
Indonesia	95.57	8528.	554.	89.23	5.80	69	50	0
Iran	22.13	4260.	227.	192.50	10.26	55	42	0
Iraq	7.10	1535.	124.	216.20	17.46	48	34	0
Ireland	2.82	1945.	27.	689.72	9.57	26	44	X
Israel	2.19	2829.	163.	1291.78	74.43	16	8	0

YEAR=1961 cont. TABLE 1961A - NATIONAL INDICATORS cont. n=73

COUNTRY (A)	POP. x10^6 (B)	GNP 1960 U.S. $ (C)	M.E. x 10^6 (D)	GNP/Cap. (E)	M.E./Cap. (F)	Ranks of "E" (G)	Ranks of "F" (H)	Rank Discrepancy (I)
Italy	49.90	38331.	1182.	768.15	23.69	25	23	0
Japan	94.06	50705.	582.	539.07	6.19	30	47	x
Jordan	1.72	351.	56.3	204.07	32.73	50	19	0
Korea-S.	25.40	4210.	445.	165.75	17.52	57	33	0
Luxemburg	0.32	524.	6.	1637.5	18.75	5	32	x
Malaysia	7.14	1928.	48.1	270.03	6.74	42	46	x
Mauritius	0.68	152.	0.2	223.53	0.29	46	73	x
Mexico	37.27	12989.	88.1	348.51	2.36	38	65	x
Mongolia	0.98	372.	15.	379.59	15.31	36	35	0
Morocco	12.03	1765.	73.7	146.72	6.13	61	49	0
Netherlands	11.64	12014.	534.	1032.13	45.88	19	10	0
New Zealand	2.42	3751.	73.	1550.00	30.17	6	21	x
Norway	3.61	4812.	161.	1332.96	44.60	14	12	0
Pakistan	102.77	7962.	203.	77.47	1.98	70	67	0
Philippines	28.31	6304.	117.	222.68	4.13	47	57	x
Poland	29.97	23495.	1062.	783.95	35.44	24	18	0
Portugal	8.89	2635.	168.	296.4	18.90	39	31	0
Rhodesia	10.57	1369.	22.3	129.52	2.11	64	66	x
Rumania	18.57	9875.	395.	531.77	21.27	31	26	0
S. Africa	16.28	7442.	89.5	457.13	5.50	35	52	x
Spain	30.56	11560.	114.	378.27	3.73	37	60	x
Sudan	12.20	1185.	21.1	97.13	1.73	68	68	*
Sweden	7.52	13924.	587.	1851.60	78.06	3	7	x
Switzerland	5.50	9464.	250.0	1720.73	45.46	4	11	x
Syria	4.69	792.	71.6	168.87	15.27	56	36	0
Thailand	27.21	2798.	107.0	102.83	3.93	66	58	0
Taiwan	10.97	1625.	339.	148.13	30.90	60	20	0
Tunisia	3.89	838.	22.3	215.42	5.73	49	51	x
Turkey	28.24	5710.	415.	202.20	14.70	53	38	0
U.A.R.	26.58	4266.	341.	160.50	12.83	58	40	0
U.K.	52.81	74495.	4628.0	1410.62	87.64	10	4	0
Uruguay	2.58	1371.	18.4	531.40	7.13	32	45	x
U.S.A.	183.76	523370.	47335.0	2848.12	257.59	1	1	*
U.S.S.R.	218.15	237371.	27619.0	1088.11	126.61	18	2	0
Venezuela	7.61	6997.	152.0	919.45	19.97	23	28	x
Vietnam-S.	14.49	2282.	279.0	157.49	19.26	59	30	0
Yugoslavia	18.61	10557.	365.0	567.28	19.61	28	29	x

YEAR = 1961 TABLE 1961B - DERIVED DATA YEAR = 1961

M.E./Cap numbers are in 1960 U.S. $

$M.E._{Total_{Th.}}$ numbers are in millions of 1960 U.S. $.

COUNTRY	BEST STRAIGHT LINE			BEST HYPERBOLA		
	$M.E./Cap._{Th.}$	$M.E._{Total_{Th}}$	T.R.	$M.E./Cap._{Th}$	$M.E._{Total_{Th}}$	T.R.
(A)	(K)	(L)	(M)	(N)	(O)	(P)
Albania	8.84	14.7	477.1	7.44	12.4	566.7
Argentina	18.66	395.7	75.6	16.46	349.0	85.7
Australia	53.79	567.5	74.9	49.06	517.6	82.1
Austria	32.78	232.4	30.5	29.55	209.5	33.9
Belgium	46.50	426.8	91.6W	42.28	388.2	100.7
Bolivia	2.35	9.2	64.2	1.80	7.0	83.7
Brazil	5.86	421.3	66.0	4.77	342.9	81.1
Bulgaria	20.43	162.3	114.6	18.10	143.7	129.4
Burma	1.10	25.1	330.1	0.90	20.4	406.4
Canada	72.52	1325.0	128.9W	66.48	1214.6	140.6W
Ceylon	3.70	37.5	40.5	2.90	29.4	51.7
China	2.58	1669.8	197.6	1.98	1282.9	257.2
Chile	17.47	137.8	84.9	15.36	121.2	96.6
Colombia	8.13	129.3	52.4	6.80	108.2	62.7
Costa Rica	32.15	41.8	13.4	28.96	37.6	14.9
Czechoslovakia	53.19	732.9	153.5	48.50	668.4	168.3
Denmark	48.47	223.4	73.4	44.11	203.4	80.6
Domin. Rep.	7.24	22.8	150.9	6.00	18.9	182.2
Ecuador	6.15	27.7	100.1	5.03	22.6	122.4
El Salvador	7.12	18.0	35.0	5.89	14.9	42.3
Ethiopia	0.44	9.3	350.1	0.50	10.5	311.1
Finland	42.29	189.0	50.8	38.37	171.5	56.0
France	47.65	2199.5	176.2	43.36	2001.3	193.7
Germany-E.	48.64	781.2	90.9	44.28	711.1	99.8
Germany-W.	49.84	2693.1	114.4	45.39	2452.7	125.7
Ghana	3.70	25.8	80.0W	2.90	20.2	102.1
Greece	15.68	131.7	167.0	13.71	115.1	191.1
Guatemala	8.55	34.0	30.3	7.18	28.6	36.0
Honduras	6.12	11.7	69.3	5.00	9.6	84.8
Hungary	32.19	322.9	63.2	29.00	290.8	70.1
India	1.42	625.0	100.0	1.11	488.8	127.9W
Indonesia	2.00	191.3	289.6	1.53	146.6	377.8
Iran	5.74	126.9	178.8	4.66	103.1	220.1

YEAR = 1961 TABLE 1961B - DERIVED DATA YEAR = 1961

M.E./Cap numbers are in 1960 U.S. $

$M.E._{Total_{Th.}}$ numbers are in millions of 1960 U.S. $

COUNTRY	BEST STRAIGHT LINE			BEST HYPERBOLA		
	$M.E./Cap._{Th}$	$M.E._{Total_{Th}}$	T.R.	$M.E./Cap._{Th}$	$M.E._{Total_{Th}}$	T.R.
(A)	(K)	(L)	(M)	(N)	(O)	(P)
Iraq	6.59	46.8	264.9	5.42	38.5	322.2
Ireland	23.72	66.9	40.4	21.14	59.6	45.3
Israel	45.49	99.6	163.6	41.34	90.5	180.0
Italy	26.55	1324.9	89.2W	23.76	1185.8	99.7W
Japan	18.27	1718.3	33.9	16.10	1513.9	38.4
Jordan	6.15	10.6	531.9	5.03	8.7	650.7
Korea-S.	4.77	121.1	367.4	3.81	96.9	459.4
Luxemburg	57.99	18.6	32.3	52.96	16.9	35.4
Malaysia	8.54	61.0	78.9	7.17	51.2	94.0
Mauritius	6.86	4.7	4.3	5.66	3.8	5.2
Mexico	11.38	424.0	20.8	9.75	363.5	24.2
Mongolia	12.50	12.3	122.4	10.78	10.6	141.9
Morocco	4.08	49.1	150.1	3.22	38.8	190.1
Netherlands	36.10	420.2	127.1	32.62	379.7	140.6
New Zealand	54.82	132.7	55.0	50.02	121.1	60.3
Norway	46.97	169.6	94.9W	42.73	154.2	104.4
Pakistan	1.58	162.0	125.3	1.22	125.5	161.7
Philippines	6.83	193.3	60.5	5.63	159.4	73.4
Poland	27.12	812.9	130.6	24.29	728.1	145.9
Portugal	9.49	84.4	199.1	8.04	71.4	235.2
Rhodesia	3.46	36.6	61.0	2.70	28.5	78.2
Rumania	18.00	334.3	118.1	15.85	294.4	134.2
S. Africa	15.30	249.2	35.9	13.36	217.5	41.1
Spain	12.45	380.6	30.0	10.74	328.2	34.7
Sudan	2.29	27.9	75.6	1.75	21.4	98.7
Sweden	65.73	494.3	118.8W	60.16	452.4	129.7W
Switzerland	61.00	335.5	74.5	55.76	306.7	81.5
Syria	4.88	22.9	312.7	3.91	18.3	390.3
Thailand	2.49	67.8	157.7	1.91	52.1	205.5
Taiwan	4.13	45.3	748.0	3.27	35.8	946.3
Tunisia	6.56	25.5	87.3	5.40	21.0	106.2W
Turkey	6.09	171.9	241.4	4.97	140.4	295.7
U.A.R.	4.58	121.7	280.2	3.65	97.0	351.5

YEAR = 1961

TABLE 1961B - DERIVED DATA

YEAR = 1961

M.E./Cap numbers are in 1960 U.S. $

$M.E._{Total_{Th.}}$ numbers are in millions of 1960 U.S. $

COUNTRY	BEST STRAIGHT LINE			BEST HYPERBOLA		
	$M.E./Cap._{Th}$	$M.E._{Total_{Th}}$	T.R.	$M.E./Cap._{Th}$	$M.E._{Total_{Th}}$	T.R.
(A)	(K)	(L)	(M)	(N)	(O)	(P)
U.S.	49.78	2629.0	176.0	45.34	2394.3	193.3
Uruguay	17.99	46.4	39.6	15.84	40.9	45.0
U.S.A.	101.76	18699.8	253.1	93.67	17213.7	275.0
U.S.S.R.	38.12	8316.1	332.1	34.50	7526.6	367.0
Venezuela	32.02	243.7	62.4	28.84	219.5	69.3
Vietnam-S.	4.47	64.8	430.8	3.56	51.5	541.5
Yugoslavia	19.29	358.9	101.7W	17.04	317.1	115.1W

TABLE 1961C-TENSION RATIOS YEAR=1961

(in descending order, Column T)

COUNTRY (A)	TENSION RATIOS Straight Line (S)	Hyper-bola. (T)	DEADLY QUARRELS At War War Began in:	New War Involvement in 1962-1966.
Taiwan	748.0	946.3		
Jordan	531.9	650.7		
Albania	477.1	566.7		
Vietnam,S.	430.8	541.5	1959	
Korea,S.	367.4	459.4		1962
Burma	330.1	406.4		
Syria	312.7	390.3		
Indonesia	289.6	377.8		
USSR	332.1	367.0		
UAR	280.2	351.5		1962
Iraq	264.9	322.2		
Ethiopia	350.1	311.1	1960	
Turkey	241.4	295.7		
USA	253.1	275.0	1959	1965
China	197.6	257.2		1962
Portugal	199.1	235.2	1960	1963,1965
Iran	178.8	220.1		
Thailand	157.7	205.5		
France	176.2	193.7	1954,1955,1961	
U.K.	176.0	193.3	1955	1963
Greece	167.0	191.1		
Morocco	150.1	190.1		
Dominican R.	150.9	182.2		1965
Israel	163.6	180.0		
Czechoslovakia	153.5	168.3		
Pakistan	125.3	161.7		1965
Poland	130.6	145.9		
Mongolia	122.4	141.0		
Netherlands	127.1	140.6		
Canada	128.9	140.6		
Rumania	118.1	134.2		
Sweden	118.8	129.7		
Bulgaria	114.6	129.4		
India	100.0	127.9		1962,1965

$TR_{Critical}$ ——— Hyperbolic =127

YEAR = 1961 TABLE 1961C-TENSION RATIOS YEAR=1961

(in descending order, Column T)

COUNTRY	TENSION RATIOS Straight Line (S)	TENSION RATIOS Hyperbola. (T)	DEADLY QUARRELS At War War began in:	DEADLY QUARRELS New War Involvement in 1962-1966.
			---Hyperbolic $TR_{Critical}$ = 127----------	
Germany, West	114.4	125.7		
Ecuador	100.1	122.4		
Yugoslavia	101.7	115.1		No War
Tunisia	87.3	106.2	1961	Involvement in
Norway	94.[illegible]	104.4		1962-1966.
Ghana	80.0	102.1		
Belgium	91.6	100.7		
Germany, East	90.9	99.8		
Italy	89.2	99.7		
Sudan	75.6	98.7		
Chile	84.9	96.6		
Malaysia	78.9	94.0		
Argentina	75.6	85.7		
Honduras	69.3	84.8		
Bolivia	64.2	83.7		
Australia	74.9	82.1		
Switzerland	74.5	81.5		
Brazil	66.0	81.1		
Denmark	73.4	80.6		
Rhodesia	61.0	78.2		
Philippines	60.5	73.4		
Hungary	63.2	70.1		
Venezuela	62.4	69.3		
Columbia	52.4	62.7		
New Zealand	55.0	60.3		
Finland	50.8	56.0		
Ceylon	40.5	51.7		
Ireland	40.4	45.3		
Uruguay	39.6	45.0		
El Salvador	35.0	42.3		
S.Africa	35.9	41.1		
Japan	33.9	38.4		
Guatemala	30.3	36.0		
Luxemburg	32.3	35.4		
Spain	30.0	34.7		
Austria	30.5	33.9		
Mexico	20.8	24.2		
Costa Rica	13.4	14.9		
Mauritius	4.3	5.2		

LIST OF DEADLY QUARRELS USED.

The list is derived from SIPRI 1968/69, pp. 365-373 with a few changes and additions. Internal wars are not included in the list

Date(s)	Deadly Quarrel	Participants
1945-54	Vietnam I	France Cambodia Laos Vietnam
1950-53	Korean War	Canada China Korea,S. Korea,N. Turkey U.K. U.S.
1952-54	Tunisia	France Tunisia
1952-57	Kenya	Kenya Mau-Mau U.K.
1954-58	Quemoy & Matsu	China Taiwan
1954-62	Algerian Independence	Algeria France
1955-59	Cyprus Independence	Cyprus U.K.
1955-59	Tibet	China Tibetans
1955-61	Cameroon Independence	Cameroons France U.K.
1956	Hungarian Crisis	Hungary USSR
1956	Suez Invasion	France Israel UAR UK
1958	Lebanon Crisis	Lebanon U.S.
1959-73	Vietnam II & III	Cambodia (1970) Korea,S.(1962-1972) Laos (1970) U.S.(1959-73) Vietnam,N(1959-) Vietnam,S(1959-)
1960-64	Somalia-Ethiopia Border	Ethiopia Somalia
1960-62	Bay of Pigs	Cuba U.S.A.
1960	Angola	Angola Portugal
1961	Bizerta Crisis	France Tunisia
1962	India-China Border	China India
1962-67	Yemen Civil War.	Saudi Arabia. U.A.R. Yemen
1963-66	Malaysian Confrontation	Indonesia Malaysia
1963-67	Aden Independence.	Aden U.K.
1963-74	Portuguese Guinea	Guinea-Bissau Portugal.
1965	Dominican Republic	Dominican R. U.S.A.
1965	India-Pakistan I	India Pakistan
1965-74	Mozambique	Mozambique Portugal
1967	Arab-Israeli	Iraq Israel Jordan Syria U.A.R.
1971	India-Pakistan II Bangla Desh	India Pakistan
1970	U.S.-Laos	U.S.A. Laos
1970	U.S.-Cambodia	U.S.A. Cambodia
1973	Yom Kippur	Israel Syria U.A.R. Jordan
1974	Cyprus	Cyprus Turkey

DETERMINATIONS OF THE CRITICAL VALUES FOR T.R.s FOR THE STRAIGHT LINE AND THE HYPERBOLIC CURVE

1961 data

STRAIGHT LINE		HYPERBOLIC CURVE	
If the value of $T.R._{Crit.}$ was set at:	then the value of P would be:	If the value of $T.R._{Crit.}$ was set at:	then the value of P would be:
259.0	0.403134	309.0	0.403134
247.0	0.159055	285.0	0.457373
220.0	0.196345	266.0	0.196345
198.0	0.063457	246.0	0.063457
188.0	0.015470	228.0	0.015470
177.0	0.021808	213.0	0.021808
175.0	0.004257	198.0	0.029786
165.0	0.006259	192.0	0.006259
160.0	0.008926	191.0	0.008926
155.0	0.012391	186.0	0.012391
152.0	0.016801	181.0	0.002102
150.5	0.003040	174.0	0.003040
140.0	0.004297	164.0	0.004297
129.0	0.005948	154.0 [2]	0.000524 [2]
128.0	0.008080	144.0	0.000779
126.0	0.010790	141.0	0.001110
124.0 [2]	0.001571 [2]	138.0	0.002136
120.0	0.002186	132.0	0.002996
118.5	0.002996	128.0	0.005399
116.0	0.004049	127.0 [1]	0.000471 [1]
114.5	0.005399	124.0 [3]	0.000656 [3]
108.0	0.007113	119.0	0.000902
101.0	0.009266	109.0	0.001227
99.0 [1]	0.001227 [1]	103.0	0.001651
93.0 [3]	0.001651 [3]		
91.0	0.002202		

[1] [2] [3] **Best values of P**

SUMMARY OF POSTDICTIONS BASED ON A STRAIGHT LINE

$TR_{Critical} = 99$

YEAR	$\frac{W^1}{O^2}$	%	$\frac{W^3}{n^4}$	%'	$\frac{\%}{\%'}$	p^5
1950	2/18	11.1	0/14	0	Ind.	0.308
1951	4/14	28.6	0/17	0	Ind.	0.0379
1952	4/14	28.6	0/19	0	Ind.	0.0245
1953	5/21	23.8	1/21	4.76	5.0	0.0815
1954	5/17	29.4	1/24	4.17	7.1	0.0762
1955	5/25	20.0	1/20	5.0	4.0	0.130
1956	3/23	33.0	0/23	0	Ind.	0.117
1957	4/29	13.8	0/27	0	Ind.	0.0647
1958	5/32	15.6	0/25	0	Ind.	0.0481
1959	5/39	12.8	0/26	0	Ind.	0.0697
1960	10/43	23.3	0/25	0	Ind.	0.00659
1961	9/34	26.	0/35	0	Ind.	0.00093
1962	11/36	31.	0/37	0	Ind.	0.00017
1963	10/41	24.	0/38	0	Ind.	0.00078
1964	9/54	17.	0/57	0	Ind.	0.00105
1965	8/53	15.	0/56	0	Ind.	0.00233
1966	10/41	20.	0/62	0	Ind.	0.00042
1967	5/49	10.	0/60	0	Ind.	0.01630
1968	10/45	22.	0/67	0	Ind.	0.00006
1969	11/54	20.	1/60	1.7	11.8	0.00110
1970	8/53	15.	1/58	1.7	8.8	0.01110
1950-1959	42/232	18.1	3/216	1.39	13.0	2×10^{-8}
1960-1970*	92/469	19.6	2/520	0.385	50.9	1×10^{-26}
1950-1970*	134/701	19.1	5/736	0.679	28.1	1×10^{-34}

Nations already at war were excluded from the analysis unless they became involved in another war.

*Data for 1961 excluded from the analysis.

1. Number of nations with TRs of 99.0 or above which became involved in war in the next 5 years.
2. Number of nations with TRs of 99.0 or above.
3. Number of nations with TRs less than 99.0 which were involved in a war within 5 years.
4. Number of nations with TRs of less than 99.0.
5. Level of significance, determined by Fisher's exact test of significance.

SUMMARY OF POSTDICTIONS BASED ON A STRAIGHT LINE

$TR_{Critical} = 124$

YEAR	$\frac{W^1}{O^2}$	%	$\frac{W^3}{U^4}$	%'	$\frac{\%}{\%'}$	p^5
1950	2/14	14.	0/18	0	Ind.	0.18347
1951	4/12	33.	0/20	0	Ind.	0.01377
1952	3/9	33.	1/24	4.2	7.9	0.05235
1953	5/12	42.	1/30	3.3	12.7	0.00471
1954	4/13	31.	1/28	3.5	8.8	0.02843
1955	5/18	28.	1/27	3.7	7.5	0.03068
1956	3/16	19.	0/30	0	Ind.	0.03699
1957	4/20	20.	0/36	0	Ind.	0.01319
1958	4/25	20.	0/32	0	Ind.	0.01269
1959	5/31	16.	0/34	0	Ind.	0.02057
1960	9/34	26.	1/34	2.9	8.9	0.00659
1961	8/26	26.	1/43	2.3	11.3	0.00124
1962	11/28	39.	0/45	0	Ind.	0.000006
1963	8/30	27.	2/49	4.	6.7	0.00529
1964	8/37	22.	1/74	1.4	15.7	0.00059
1965	8/43	19.	0/66	0.	Ind.	0.00038
1966	10/38	26.	0/75	0.	Ind.	0.000008
1967	5/37	14.	0/72	0.	Ind.	0.00373
1968	10/38	26.	0/74	0.	Ind.	0.000008
1969	11/39	28.	1/75	1.3	21.5	0.00002
1970	8/37	22.	1/74	1.4	15.7	0.00059
1950-1959	39/170	22.9	4/279	1.43	16.0	1×10^{-12}
1960-1970*	90/361	24.9	6/638	0.94	26.5	1×10^{-31}
1950-1970*	129/531	24.3	10/917	1.09	22.3	1×10^{-44}

Nations already at war were excluded from the analysis unless they became involved in another war.

* Data for 1961 excluded from the analysis.

1. Number of nations with TRs of 124 or above which went to war within 5 years
2. Number of nations with TRs of 124 or above.
3. Number of nations with TRs less than 124 which were involved in a war within 5 years.
4. Number of nations with TRs less than 124.
5. Level of significance, determined by the exact test of significance.

SUMMARY OF POSTDICTIONS BASED ON A HYPERBOLIC CURVE

$TR_{Critical} = 127$

YEAR	$\frac{W^1}{O^2}$	%	$\frac{W^3}{U^4}$	%'	$\frac{\%}{\%'}$	p^5
1950	2/16	12.5	0/17	0	Ind.	0.22727
1951	4/13	31.	0/20	0	Ind.	0.01747
1952	4/14	29.	1/22	4.5	6.4	0.06373
1953	6/15	40.	1/30	3.3	12.1	0.00345
1954	5/19	26.	1/25	4.	6.5	0.04503
1955	5/17	29.	1/31	3.2	9.1	0.01664
1956	3/17	18.	0/30	0.	Ind.	0.04194
1957	4/18	22.	0/39	0.	Ind.	0.00775
1958	5/26	19.	0/34	0.	Ind.	0.01205
1959	5/30	17.	0/35	0.	Ind.	0.01725
1960	9/34	26.	1/35	2.9		0.00579
1961	9/31	29.	0/38	0.	Ind.	0.00036
1962	9/29	31.	2/44	4.6	6.81	0.00292
1963	8/31	25.8	2/48	4.2	6.19	0.00688
1964	8/38	21.1	1/73	1.37	15.4	0.00074
1965	8/36	22.2	0/73	0.	Ind.	0.00008
1966	10/37	27.0	0/76	0.	Ind.	0.00001
1967	5/32	15.6	0/77	0.	Ind.	0.00172
1968	10/41	24.4	0/75	0.	Ind.	0.00001
1969	11/40	27.5	1/76	1.32	20.8	0.00003
1970	8/38	21.1	1/75	1.33	15.9	0.00064
1950-1959	43/185	23.24	4/283	1.41	16.5	1×10^{-13}
1960-1970*	86/356	24.16	8/652	1.23	19.6	1×10^{-29}
1950-1970*	129/541	23.86	12/935	1.28	18.6	1×10^{-46}

Nations already at war were excluded from the analysis unless they became involved in another war.

* Data for 1961 excluded from the analysis.

1. Number of nations with TRs of 127 or higher which became involved in war in the following five years.
2. Number of nations with TRs of 127 or higher.
3. Number of nations with TRs less than 127 which became involved in war in the next 5 years years.
4. Number of nations with TRs less than 127.
5. Level of significance, determined by the exact test of significance.

COUNTRY	POP. x10^6 (B)	GNP 1973 U.S.$ x 10^6 (C)	M.E. (D)	GNP/Cap. (E)	M.E./Cap. (F)	n=71 Ranks of "E" (G)	"F" (H)	Rank Discrepancy (I)
Australia	13.20	58477.5	1873.9	4430.11	141.97	12	13	X
Austria	7.45	28336.5	270.1	3803.56	36.25	13	31	X
Belgium	9.73	46033.8	1259.0	4731.12	129.40	9	14	X
Bolivia	5.01	873.5	28.9	174.35	5.78	65	54	0
Brazil	103.00	62042.0	1328.4	602.35	12.90	41	45	X
Bulgaria	8.62	15700.0	1333.0	1820.92	154.60	26	10	0
Burma	29.60	2479.0	130.8	83.75	4.42	71	58	0
Canada	22.10	117040.8	2391.0	5295.96	108.19	6	19	X
Chile	9.52	13898.0	245.3	1459.87	25.77	30	36	X
China	898.60	181000.0	15000.0	201.42	16.69	61	41	0
Colombia	24.10	10065.7	100.9	417.66	4.19	48	59	X
Cyprus	0.65	923.1	10.0	1420.15	15.34	31	42	X
Czechoslovakia	14.60	44800.0	2703.0	3068.49	185.14	16	6	0
Denmark	5.02	27896.4	615.6	5557.05	122.64	5	15	X
Dominican Rep.	4.66	2233.0	32.8	479.18	7.04	45	50	X
Ecuador	6.73	2551.5	51.2	379.12	7.61	51	49	0
UAR	35.10	8794.0	1324.1	250.54	37.72	59	30	0
El Salvador	3.87	1257.6	15.5	324.96	4.01	53	62	X
Ethiopia	27.30	2452.8	58.8	89.85	2.15	70	68	0
Finland	4.64	15812.5	276.1	3407.87	59.50	15	25	X
France	52.00	258076.0	9339.9	4963.00	179.61	7	8	X
Germany-West	17.00	47500.0	3109.0	2794.12	182.88	18	7	0
Germany-East	62.00	346748.3	11825.2	5592.72	190.73	4	5	X
Ghana	9.95	2743.2	44.8	275.70	4.50	57	57	*
Greece	9.23	16087.4	659.6	1742.95	71.46	27	24	0
Guatemala	5.60	2474.5	21.0	441.88	3.75	46	64	X
Honduras	2.98	869.0	12.4	291.61	4.18	56	60	X
Hungary	10.40	21700.0	1209.0	2086.54	116.25	23	16	0
India	603.30	73402.6	2287.6	121.67	3.79	66	63	0
Indonesia	129.90	12544.9	384.6	96.57	2.96	68	65	0
Iran	33.30	22812.2	2611.8	685.05	78.43	38	21	0
Ireland	3.04	6404.2	86.8	2106.64	28.54	22	33	X
Israel	3.24	8706.0	3953.1	2687.04	1220.09	20	1	0
Italy	54.80	136969.3	4092.7	2499.44	74.68	21	23	X
Japan	110.60	408106.0	3593.1	3689.93	32.49	14	32	X
Jordan	2.51	803.0	135.8	319.92	54.09	54	26	0

YEAR = 1973 TABLE 1973A - NATIONAL INDICATORS YEAR = 1973

GNP, M.E. & POP. NUMBERS
ARE IN MILLIONS

NUMBER OF COUNTRIES
IN 1973 = 71

COUNTRY (A)	POP. (B) x10	GNP 1973 U.S.$ (C)	M.E. x10^6 (D)	GNP/CAP. (E)	M.E./CAP. (F)	RANKS OF "E" (G)	RANKS OF "F" (H)	RANK DISCREPANCY (I)
Kenya	13.10	2392.5	31.6	182.63	2.41	63	67	X
[illegible]	33.80	12314.3	478.1	364.33	14.15	52	43	0
[illegible]mburg	0.35	1619.0	14.8	4625.71	42.14	10	29	X
[illegible]awi	0.77	497.9	3.9	646.62	5.00	39	56	X
[illegible]sia	11.84	6451.0	237.6	544.85	20.06	42	39	0
[illegible]	55.90	49329.9	344.0	882.47	6.15	37	53	X
[illegible]	17.50	5114.7	169.0	292.27	9.66	55	46	0
Netherlands	13.40	59895.9	2032.0	4469.84	151.64	11	12	X
Nicaragua	2.11	1094.3	18.6	518.63	8.80	43	47	X
Norway	3.96	19166.5	624.6	4840.02	157.74	8	9	X
Pakistan	65.40	6313.8	448.0	96.54	6.85	69	51	0
Panama	1.56	1590.5	2.1	1019.55	1.35	35	71	X
Paraguay	2.43	980.8	13.7	403.62	5.65	50	55	X
Peru	14.70	9181.5	260.8	624.59	17.74	40	40	*
Philippines	42.10	10860.2	172.0	257.96	4.09	58	61	X
Poland	33.40	62100.0	3860.0	1859.28	115.57	24	17	0
Portugal	8.43	10468.8	631.7	1241.85	74.93	32	22	0
Rumania	20.90	38200.0	1839.0	1827.75	87.99	25	20	0
Sierra Leone	2.84	529.8	4.5	186.59	1.57	62	70	X
S. Africa	23.60	26099.7	642.2	1105.92	27.21	34	34	*
U.S.S.R.	249.70	697000.0	86000.0	2791.35	344.41	19	3	0
Spain	34.90	60103.4	1875.5	1722.16	53.74	28	27	0
Ceylon	13.20	2327.6	25.5	176.33	1.93	64	69	X
Sweden	8.13	50743.7	1757.6	6241.54	216.19	2	4	X
Switzerland	6.44	41532.3	721.1	6449.11	111.98	1	18	X
Tanzania	14.40	1715.2	41.2	119.11	2.86	67	66	0
Thailand	39.60	9199.6	331.6	232.31	8.38	60	48	0
Tunisia	5.48	2396.8	34.2	437.37	6.24	47	52	X
Turkey	38.20	19525.1	891.6	511.13	23.34	44	38	0
U.K.	56.00	170884.5	8536.1	3051.51	152.43	17	11	0
U.S.A.	210.40	1294900.0	78462.0	6154.47	372.92	3	2	0
Uruguay	2.99	2793.9	70.1	934.42	23.46	36	37	X
Venezuela	11.89	17673.6	310.0	1486.43	26.07	29	35	X
Yugoslavia	20.90	23953.9	883.1	1146.12	42.26	33	28	0
Zambia	4.82	1980.6	68.0	410.91	14.12	49	44	0

YEAR= 1973 TABLE 1973B - DERIVED DATA YEAR= 1973

M.E./Cap numbers are in current U.S. $

$M.E._{Total_{Th.}}$ numbers are in millions of current U.S. $

COUNTRY	BEST STRAIGHT LINE			BEST HYPERBOLA		
	$M.E./Cap._{Th.}$	$M.E._{Total_{Th.}}$	T.R.	$M.E./Cap._{Th.}$	$M.E._{Total_{Th.}}$	T.R.
(A)	(K)	(L)	(M)	(N)	(O)	(P)
Australia	152.28	2010.1	93.2	152.37	2011.3	93.2
Austria	130.17	969.8	27.8	130.26	970.5	27.8
Belgium	162.90	1585.0	79.4	162.99	1585.9	79.4
Bolivia	2.12	10.6	272.5	3.33	16.7	173.8
Brazil	17.22	1773.9	74.9	17.61	1813.4	73.3
Bulgaria	60.22	519.1	256.7	60.36	520.3	256.1
Burma	0.00	0.0	IND.	0.97	28.6	456.5
Canada	182.83	4040.5	59.2	182.92	4042.5	59.1
Chile	47.48	452.0	54.3	47.65	453.6	54.1
China	3.08	2764.1	542.7	4.14	3721.2	403.1
Colombia	10.71	258.0	39.1	11.25	271.1	37.2
Cyprus	46.08	29.9	33.3	46.25	30.1	33.2
Czechoslovakia	104.23	1521.8	177.6	104.34	1523.3	177.4
Denmark	192.04	964.0	63.9	192.13	964.5	63.8
Dominican Rep.	12.88	60.0	54.7	13.35	62.2	52.7
Ecuador	9.35	62.9	81.4 W	9.94	66.9	76.5 W
UAR	4.81	168.8	784.4	5.69	199.6	663.4
El Salvador	7.43	28.8	53.9	8.13	31.4	49.4
Ethiopia	0.00	0.0	IND.	1.10	30.0	196.2
Finland	116.21	539.2	51.2	116.31	539.7	51.2
France	171.08	8896.1	105.0 W	171.17	8900.8	104.9 W
Germany-West	94.55	1607.4	193.4	94.66	1609.2	193.2
Germany-East	193.30	11984.4	98.7	193.39	11990.0	98.6
Ghana	5.70	56.7	79.0	6.50	64.7	69.2
Greece	57.47	530.4	124.4	57.61	531.8	124.0
Guatemala	11.56	64.7	32.4	12.08	67.6	31.1
Honduras	6.26	18.6	66.8	7.02	20.9	59.5
Hungary	69.59	723.7	167.1	69.72	725.1	166.7
India	0.26	158.1	1447.0	1.86	1121.3	204.0
Indonesia	0.00	0.0	IND.	1.25	162.1	237.3
Iran	20.14	670.7	389.4	20.48	682.0	383.0
Ireland	70.30	213.7	40.6	70.43	214.1	40.5
Israel	90.78	294.1	1344.1	90.89	294.5	1342.5
Italy	84.16	4611.8	88.7	84.27	4618.0	88.6
Japan	126.16	13953.4	25.8	126.26	13963.9	25.7
Jordan	7.26	18.2	745.3	7.96	20.0	679.7
Kenya	2.41	31.6	100.0	3.57	46.8	67.6

YEAR= 1973 TABLE 1973B - DERIVED DATA YEAR= 1973
(continued - 2)

M.E./Cap numbers are in current U.S. $

M.E.$_{Total_{Th.}}$ numbers are in millions of current U.S. $

COUNTRY	BEST STRAIGHT LINE			BEST HYPERBOLA		
	M.E./Cap.$_{Th.}$	M.E.$_{Total_{Th.}}$	T.R.	M.E./Cap.$_{Th.}$	M.E.$_{Total_{Th.}}$	T.R.
(A)	(K)	(L)	(M)	(N)	(O)	(P)
Korea-South	8.82	298.2	160.3	9.44	319.2	149.8
Luxembourg	159.18	55.7	26.5	159.27	55.7	26.5
Malawi	18.78	14.5	26.6	19.14	14.7	26.1
Malaysia	15.19	179.9	132.1	15.62	184.9	128.5
Mexico	27.11	1515.2	22.7	27.37	1530.1	22.5
Morocco	6.28	109.9	153.8	7.04	123.3	137.1
Netherlands	153.68	2059.3	98.7	153.77	2060.5	98.6
Nicaragua	14.27	30.1	61.7	14.71	31.0	59.8
Norway	166.74	660.3	94.6	166.83	660.6	94.5
Pakistan	0.00	0.0	IND.	1.25	81.6	549.3
Panama	31.94	49.8	4.2	32.18	50.2	4.2
Paraguay	10.21	24.8	55.3	10.77	26.2	52.4
Peru	18.01	264.7	98.5	18.38	270.2	96.5
Philippines	5.07	213.5	80.6	5.93	249.5	68.9
Poland	61.57	2056.4	187.7	61.71	2061.1	187.3
Portugal	39.79	335.4	188.3	39.98	337.0	187.4
Rumania	60.46	1263.6	145.5	60.60	1266.5	145.2
Sierra Leone	2.55	7.2	61.7	3.69	10.5	42.7
S. Africa	34.99	825.7	77.8	35.21	830.9	77.3
USSR	94.46	23585.8	364.6	94.56	23612.4	364.2
Spain	56.73	1980.0	94.7 W	56.88	1985.1	94.5 W
Ceylon	2.19	28.9	88.2	3.38	44.7	57.1
Sweden	216.19	1757.6	100.0	216.28	1758.4	100.0
Switzerland	223.51	1439.4	50.1	223.61	1440.0	50.1
Tanzania	0.17	2.5	1663.8	1.79	25.8	159.4
Thailand	4.17	165.0	201.0	5.11	202.2	164.0
Tunisia	11.40	62.5	54.7	11.92	65.3	52.3
Turkey	14.00	534.9	166.7	14.45	552.1	161.5
U.K.	103.64	5803.6	147.1	103.74	5809.3	146.9
U.S.A.	213.12	44839.8	175.0	213.21	44859.1	174.9
Uruguay	28.94	86.5	81.1	29.19	87.3	80.4
Venezuela	48.41	575.7	53.9	48.58	577.6	53.7
Yugoslavia	36.41	760.9	116.1	36.62	765.3	115.4
Zambia	10.47	50.5	134.9	11.02	53.1	128.1

TABLE [illegible]3C - TENSION RATIOS

YEAR = 1973

(in descending order, Column T)

COUNTRY (A)	TENSION RATIOS Straight Line (S)	Hyper-bola. (T)	DEADLY QUARRELS At War War Began in:	New War Involvement in 1974-1978
Israel	1344.1	1342.5	1973	
Jordan	745.3	679.7	1973	
U.A.R.	784.4	663.4	1973	
Pakistan	Ind.	549.3		
Burma	Ind.	456.5		
China	542.7	403.1		
Iran	389.4	383.0		
U.S.S.R.	364.6	364.2		
Bulgaria	256.7	256.1		
Indonesia	Ind.	237.3		
India	1447.0	204.0		
Portugal	188.3	187.4	1960, 1965, 1965	
Poland	187.7	187.3		
Czechoslovakia	177.6	177.4		
U.S.A.	175.0	174.9		
Bolivia	272.5	173.8		
Ethiopia	Ind.	196.2		
Germany-W.	193.4	193.2		
Hungary	167.1	166.7		
Thailand	201.0	164.0		
Turkey	166.7	161.5		1974
Tanzania	1663.8	159.4		
Korea-S.	160.3	149.8		
U.K.	147.1	146.9		
Rumania	145.5	145.2		
Morocco	153.8	137.1		
Malaysia	132.1	128.5		
Zambia	134.9	128.1		
Greece	124.4	124.0		
Yugoslavia	116.1	115.4		
France	105.0	104.9		
Sweden	100.0	100.0		
Germany-E.	98.7	98.6		
Netherlands	98.7	98.6		

YEAR = 1973 TABLE 1973C - TENSION RATIOS YEAR = 1973

(in descending order, Column T)

COUNTRY	TENSION RATIOS		DEADLY QUARRELS	
	Straight Line (S)	Hyperbola. (T)	At War War Began in:	New War Involvement in 1974-1978
Peru	98.5	96.5		
Norway	94.6	94.5		
Spain	94.7	94.5		
Australia	93.2	93.2		
Italy	88.7	88.6		
Uruguay	81.1	80.4		
Belgium	79.4	79.4		
S. Africa	77.8	77.3		
Ecuador	81.4	76.5		
Brazil	74.9	73.3		
Ghana	79.0	69.2		
Philippines	80.6	68.9		
Kenya	100.0	67.6		
Denmark	63.9	63.8		
Nicaragua	61.7	59.8		
Honduras	66.8	59.5		
Canada	59.2	59.1		
Ceylon	88.2	57.1		
Chile	54.3	54.1		
Venezuela	53.9	53.7		
Dominican Rep.	54.7	52.7		
Paraguay	55.3	52.4		
Tunisia	54.7	52.3		
Finland	51.2	51.2		
Switzerland	50.1	50.1		
El Salvador	53.9	49.4		
Sierra Leone	61.7	42.7		
Ireland	40.6	40.5		
Colombia	39.1	37.2		
Cyprus	33.3	33.2		1974
Guatemala	32.4	31.1		
Austria	27.8	27.8		
Luxembourg	26.5	26.5		
Malawi	26.6	26.1		
Japan	25.8	25.7		
Mexico	22.7	22.5		
Panama	4.2	4.2		